

The presence of lipids in soup, yoghurt, ice cream, mayonnaise or sausages, is often in the form of emulsions. Overconsumption of fat rich products but in the same time high in sugar and low in dietary fibre leads to development of overweight, obesity, type 2 diabetes, hypertension or heart diseases. These diseases are targeting both the adult and young population. In this project, we are unpicking the mechanism of lipid digestion by adding of fibre or structuring the lipids by plant protein, so we can slow down the lipid digestion.

The project aim is to understand how the protein and fibre together can reduce the lipid digestion in emulsions. In this study, we will formulate oil-in-water emulsions stabilised by a range of proteins and fibres. A range of protein will be tested such as rapeseed, soya, pea, wheat protein, whey protein or casein micelles. Formulation of oil-in-water emulsions will be manufacture with a presence of natural fibre (beta-glucan or cellulose). The obtained emulsions will be measured, focusing on stability against coalescence, droplet size and interfacial composition. The most stable emulsions will be selected and subjected in the next stage of digestion procedure in vitro. The rate and extent of lipid digestion will be measured, along with changes in rheology and microstructure of emulsion. The changes at interfacial layer of oil and water, will be examined carefully by advanced microscopic methods such as scanning electron microscope. The fibre rich emulsions that due to their molecular and macrostructural architecture, will slow down the lipid digestion, and will then be selected. In the next stage, the emulsions will be incorporated into relevant food products such as a sausage, pate, yogurt or other. And, the enriched emulsion foods will be digested and kinetics of lipid digestion will be recorded. The designed reduction of lipid digestion in emulsion rich foods will be then tested in textural, colour, rheology experiment in order to validate the sensory properties of novel foods.

The project results will bring new knowledge how fibre rich emulsion can reduce the lipid digestion. The effect of a different range of fibre and protein will be evaluated if they can modulate the lipid but also protein digestion. Molecular understanding will deliver how the emulsions can be manufactured in order to ensure their stability and defined fate in the gastrointestinal tract, measured in vitro. The project data might potentially show a direction to design of food with satiety-inducting ingredients.